

Ewbank
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GEO SYSTEMS PROFESSIONALS

Thermal Conductivity Test
Cleveland Schools
Cleveland, TN

Earth Energy Engineering

MIDDLE Drill Log for Cleveland School Site

Hole # 1 Nearest Road

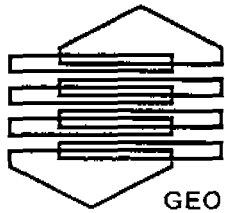
56 ft PVC casing inserted

From ft	To ft	Material	GPM
0	58	Clay	
58	300	Limestone	1
		1 GPM at 200'	

Hole # 2 Back in field

39 ft PVC casing inserted

From ft	To ft	Material	GPM
0	28	Clay	
28	42	Fractured Limestone	
42	300	Limestone	1
		1 GPM at 235'	



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**Thermal Conductivity Test Results
Cleveland Schools
Cleveland, Tennessee**

Earth Energy Engineering performed a thermal conductivity test at the Cleveland Schools in Cleveland, Tennessee on June 20, 1999. Testing was done by Bill Nagle with a Ewbank portable test unit.

The test borehole was 300 feet in depth and 6" in diameter. A 1" inch loop was installed and the borehole was backfilled with #9 stone. Static water level was reported at 120 feet. The formations encountered were primarily limestone and shale.

The relatively low static water level and the use of stone backfill may have influenced this test. Stone or gravel backfill fully saturated is a very good conductor of heat. However, in dry conditions it is a poor conductor. The portion of the borehole above the water level will not be efficient at conducting heat. As a result, the thermal conductivity value may be conservative.

The thermal conductivity (**k**) value for this borehole is **1.3 btu/degree F-hr-foot**. This is an average conductivity per foot for the borehole. This value represents the rate at which the borehole and rock will transfer heat. To accurately measure the thermal conductivity of the formation a borehole should be drilled and grout with a bentonite grout to prevent any flow of water through the borehole.

All test equipment, methods, procedures, calculations, and interpretation is done in accordance with the recommendations and guidelines of the International Ground Source Heat Pump Association.